

What is claimed:

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1. A method of using silyl chemistry to control the reactivity of a self-assembled molecular electro-optic material, said method comprising:  
providing an electro-optic material comprising a silyl-derivatized chromophore;  
desilylating said chromophore to generate terminal hydroxy functionalities; and  
reacting said hydroxy functionalities with a reagent having at least one silicon moiety.
  2. The method of Claim 1 wherein said chromophore is a high- $\beta$  chromophore.
  3. The method of Claim 1 wherein said chromophore is derivatized with a trialkylsilyl protecting group.
  4. The method of Claim 3 wherein said chromophore is derivatized with a *tert*-butyldimethylsilyl protecting group.
  5. The method of Claim 1 wherein said chromophore is desilylated by treatment with a deprotecting agent.
  6. The method of Claim 1 wherein said chromophore is derivatized with a *tert*-butyldimethylsilyl protecting group.
  7. The method of Claim 6 wherein said chromophore compound is desilylated with a quaternary ammonium fluoride.
  8. A method of using silyl chemistry to generate a hydrophilic surface for molecular self-assembly of an electro-optic material, said method comprising:  
providing an electro-optic material comprising a high- $\beta$  chromophore film with terminal trialkylsiloxo moieties;  
desilylating said film to generate terminal hydroxy functional groups; and  
reacting said terminal hydroxy functional groups with a siloxane capping agent.

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9. The method of Claim 8 wherein said film is desilylated by nucleophilic reaction at trialkylsiloxo moieties.

10. The method of Claim 8 wherein said film has terminal *tert*-butyldimethylsiloxo moieties.

11. The method of Claim 10 wherein said film is desilylated with tetra-*n*-butylammonium fluoride.

12. A method for assembling a multi-layered electro-optic siloxane film, said method comprising:

providing a substrate with a hydroxylated surface;

coupling a chromophore layer to said surface, said layer comprising a plurality of chromophore molecules, each said molecule reactive with said surface and having a terminal trialkylsiloxo moiety;

desilylating said chromophore layer to generate terminal hydroxy functionalities; and

coupling said chromophore layer with a capping layer, said capping layer comprising molecular components and each said component having at least two silicon moieties, said coupling providing a siloxane bond sequence between said chromophore and capping layers.

13. The method of Claim 12 wherein said chromophore molecule is a high- $\beta$  chromophore.

14. The method of Claim 13 wherein each said high- $\beta$  chromophore has a terminal *tert*-butyldimethylsiloxo moiety.

15. The method of Claim 12 wherein said chromophore is desilylated by reaction of a nucleophile with said trialkylsiloxo moiety.

16. The method of Claim 15 wherein each said high- $\beta$  chromophore has a terminal *tert*-butyldimethylsiloxo moiety.

17. The method of Claim 16 wherein said chromophore is desilylated with tetra-*n*-butylammonium fluoride.

18. The method of Claim 12 wherein said capping layer comprises octachlorotrisiloxane.

19. The method of Claim 18 wherein a second chromophore layer is coupled to said capping layer, said second chromophore layer comprising a plurality of chromophore molecules, each said chromophore molecule reactive with said capping layer and having a terminal trialkylsiloxy moiety.

20. The method of Claim 18 wherein said second coupled chromophore layer is desilylated then coupled with a second capping layer.

252/582 21. A non-linear optical <sup>Article</sup> (material) comprising a plurality of molecular bilayers, each said bilayer comprising a first chromophore molecular layer coupled to a capping molecular layer with a siloxane bond sequence, said capping molecular layer capable of coupling to another chromophore molecular layer with a siloxane bond sequence.

22. The material of Claim 21 wherein said chromophore is a high- $\beta$  chromophore.

23. The material of Claim 21 wherein said capping layer is a polysiloxane.

24. The material of Claim 23 wherein said capping layer comprises octachlorosiloxane.

25. The material of Claim 21 wherein said bilayers are deposited on a substrate.

26. The material of Claim 25 wherein said substrate and said bilayers are incorporated into a waveguide device.

252/582 27. A chromophore composition with non-linear optical properties having the structural formula  $(Ch)XR_n$ , wherein  $(Ch)X$  is a chromophore substructure and  $X$  is a heteroatom;  $R$  is a trialkylsiloxyalkyl moiety; and  $n$  is the number of said moieties meeting the valence requirement of said heteroatom.

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